A combination of clinical risk stratification and fecal immunochemical test results to prioritize colonoscopy screening in asymptomatic participants

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Background: Stool-based colonoscopy is the preferred strategy for colorectal cancer (CRC) screening. The Asia-Pacific Colorectal Screening System (APCS) score also is helpful in stratifying the risk for advanced neoplasia in the asymptomatic population. The combination of the fecal immunochemical test (FIT) result and clinical risk stratification may be more helpful in stratifying the risk.

Objective: To evaluate the value of the combination of FIT and APCS scores in stratifying asymptomatic participants for colonoscopy.

Design: Cross-sectional study.

Setting: University hospital.

Patients: A total of 948 asymptomatic participants eligible for screening colonoscopy.

Interventions: FIT, APCS score evaluation, screening colonoscopy.

Main Outcome Measurements: The prevalence of colorectal neoplasia in 4 different groups of participants according to FIT and APCS score evaluations.

Results: The prevalence of non-advanced and advanced neoplasia in the 4 groups (high risk with positive FIT result, high risk with negative FIT result, moderate risk with positive FIT result, and moderate risk with negative FIT result) was 44% versus 36.9%, 30.1% versus 11.6%, 27.1% versus 12%, and 22.6% versus 6.4%, respectively ($P < .001$). Participants with both high-risk scores and positive FIT results had a significantly higher detection rate of advanced neoplasia (6.15-fold, 95% confidence interval, 3.72-10.17) compared with the other 3 groups. Seven cancers were discovered; 4 were in the high-risk with positive FIT result group.

Limitations: Hospital-based study.

Conclusion: In countries with limited resources, participants with positive FIT results and high-risk scores by APCS should be given priority for colonoscopy because this group is most likely to have advanced neoplasia. However, this strategy needs to be confirmed for its cost-effectiveness in a large, population-based study. (Clinical trial registration number: TCTR20140228001.) (Gastrointest Endosc 2015;81:719-27.)

Abbreviations: APCS, Asia-Pacific Colorectal Screening System; CRC, colorectal cancer; FIT, fecal immunochemical test; gFOBT, guaiac-based fecal occult blood test; NSAID, nonsteroidal anti-inflammatory drug.

DISCLOSURE: *This research was supported by the Ratchadaphiseksomphot Endowment Fund of Chulalongkorn University (CU-57-001-HR). All authors disclosed no financial relationships relevant to this publication.*

0016-5107/$36.00
http://dx.doi.org/10.1016/j.gie.2014.11.035

Received September 8, 2014. Accepted November 9, 2014.

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Colorectal cancer (CRC) is one of the most common cancers and a major leading cause of cancer-related mortality worldwide.[1] The incidence of CRC has rapidly increased in many Asian countries.[2,3] There is strong evidence that CRC screening is cost effective.[4,5] Colonoscopy is considered the most accurate test for the early detection and prevention of CRC.[6] However, colonoscopy requires investment in expensive resources, including an endoscopy unit. In addition, many countries have few well-trained endoscopists, which is incompatible with the colonoscopy screening volume. Hence, using colonoscopy as a primary screening method may not be feasible.[7] Therefore, the fecal immunochemical test (FIT), a less-expensive strategy, is preferred as the primary screening method in many countries.[7,8] Importantly, the colon adenoma prediction rate by FIT is close to that of primary colonoscopy at 25%.[9]

If FIT is chosen as a primary mode of CRC screening, by rough calculation, the actual number of colonoscopies that must be performed in asymptomatic individuals may be reduced 4-fold. The recent CRC screening guidelines[10,11] recommend repeating colonoscopy within 10 years for a negative first colonoscopy in an individual with an average risk. Although FIT can reduce the workload 4-fold, it may take many years to finish all required colonoscopies in a limited-resource country such as Thailand, with a population of 66 million[12] and only 1000 practicing colonoscopists.[13] Therefore, a method for substratifying and prioritizing participants for colonoscopy during those years is necessary.

The previous analyses demonstrated that certain variables including sex,[14] age,[15] smoking history,[16] and family history of CRC[17] had a significant association with advanced neoplasia. By using this simple clinical information, the Asia-Pacific Colorectal Screening System (APCS) was developed and validated for predicting the risk of advanced neoplasia in asymptomatic participants from 11 countries in Asia.[7] After application of the APCS score, participants were classified into the following 3 groups: low risk, moderate risk, and high risk. The prevalence of advanced neoplasia in moderate-risk and high-risk participants increased 2.6-fold and 4.3-fold, respectively, compared with the low-risk participants.[7] Therefore, we proposed that a combination of the FIT and APCS scores would be helpful in selecting and prioritizing asymptomatic participants for colonoscopy. We hypothesized that FIT-positive participants with a high-risk score would have the highest percentage of advanced neoplasia detection by colonoscopy.

MATERIALS AND METHODS

Study population

We conducted a study between February 2013 and July 2014. Asymptomatic participants who participated in the health promotion program at the King Chulalongkorn Memorial Hospital were recruited. Asymptomatic participants, aged 50 to 75 years, were enrolled. Exclusion criteria were history of CRC, adenoma, or inflammatory bowel disease, family history of hereditary CRC ($\geq$2 first-degree relatives with CRC or at least one first-degree relative diagnosed with CRC before age 60 years),[18] previous colorectal surgery, severe coexisting illness, previous colon examination (endoscopy and radiologic imaging), and symptoms of lower GI tract (lower GI bleeding, bowel habit changes, unexplained weight loss, and anemia). All participants provided written informed consent. The study was approved by the Chulalongkorn Medical Institutional Review Board (Thai Clinical Trial Registry TCTR20140228001).

Clinical risk factors

All participants were interviewed to determine their clinical risk scores by the research assistant (Y.P.). APCS score risk stratification is in agreement with many international CRC risk stratifications. By using the APCS score, we stratified participants into 3 groups (low risk, score 0-1; moderate risk, score 2-3; high risk, score 4-7) (Table 1).[7] Because participants aged 50 to 75 years were our study target, we excluded all those aged $<$50 years. As a result, we studied only 2 groups according to APCS score, (1) moderate risk and (2) high risk.

For example, men (score = 1) at age 50 years (score = 2, total score = 3) would be classified into moderate risk, although this group would be considered as average-risk in the standard screening program. Meanwhile, women (score = 0) at age 50 years (score = 2) with family history of CRC (score = 2, total score = 4) would be classified into high risk, and this would be considered as high risk in other standard screening programs as well.

FIT

Without specific recommendations for diet or medication restrictions, participants collected a one-time stool sample at home within 3 days before colonoscopy. Participants were asked to return the stool container on the day of colonoscopy. The qualitative fecal immunochemical test (SD Bioline FOB, Standard Diagnostics, Inc, Yongi-si, Kyonggi-do, Korea) was used. The cut-off hemoglobin detection limit indicated by the manufacturer was 50 ng/mL. The FIT was interpreted by the medical laboratory scientist (S.C.), who was blinded to the APCS score and the colonoscopy result. The stool sample collection, storage, and testing were performed according to the manufacturer's instructions.[19]

Colonoscopy

Bowel preparation and total colonoscopy were performed as described previously.[20] Sedation with intravenous midazolam and/or meperidine was used for